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by

DALE S. JENSEN

EDWARD E. DURRANT

for

DEVICE FOR IMPROVED REMOVAL OF LIQUID FROM FABRIC

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BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

[0001] The present invention relates generally to a device for improving the efficiency of a carpet cleaning machine and other extraction machines in removing cleaning solution and other liquids from fabric, such as carpet. More particularly, the present invention relates to an improved vacuum head for extracting a fluid from carpet.

DESCRIPTION OF THE RELATED ART

[0002] Carpet-cleaning machines spray a cleaning solution onto a fabric or carpet and then vacuum the solution from the carpet into the machine. Other extraction machines may spray a liquid onto a fabric or simply remove a pre-existing liquid from the fabric.

[0003] Carpet-cleaning machines typically include a wand with a cleaning head that is movable over the carpet, or a rotating platform that rotates one or more cleaning heads over the carpet. The cleaning heads usually include a spray nozzle for spraying a liquid, such as a cleaning solution, onto and/or into the carpet. In addition, the cleaning heads usually include a vacuum head for vacuuming or sucking the fluid, and any dirt, from the carpet. The vacuum heads commonly include a large opening, such as with an inverted funnel, which sits and moves atop the carpet vacuuming or sucking the fluid, and any dirt from the carpet.

[0004] One disadvantage with many vacuum heads is their inefficiency. Some vacuum heads remove less than 20% of the fluid. It will be appreciated that the fluid remaining in the carpet renders the carpet wet, and thus off limits for many hours while the carpet dries. In addition it will be appreciated that a significant amount of dirt remains in the carpet with the remaining fluid. What is needed is a vacuum head device for removing a fluid that overcomes many or all of these limitations.

KUNZLER & ASSOCIATES
ATTORNEYS AT LAW
10 WEST 100 SOUTH, SUITE 450
SALT LAKE CITY, UTAH 84101

[0005] The following patents are offered to assist in understanding the state of the art known to be at least somewhat related to the present invention, and are herein incorporated by reference for their supporting teachings:

[0006] U.S. patent no. 4,000,538 is a cleaning device.

U.S. patent no. 4,095,309 is an apparatus for cleaning a carpet.

U.S. patent no. 4,182,001 is a surface cleaning and rinsing device.

U.S. patent no. 4,270,238 is a cleaning tool.

U.S. patent no. 4,391,017 is a device for removing incendiary matter from the interior of an aircraft.

U.S. patent no. 4,677,705 is an exhauster nozzle.

U.S. patent no. 4,692,959 is a rotary cleaner/scrubber mechanism.

U.S. patent no. 5,463,791 is a surface cleaning appliance.

U.S. patent no. 5,992,051 is the carpet drying system.

U.S. patent no. 6,266,892 B1 is a device for enhancing removal of liquid from fabric.

U.S. patent no. 6,298,577 B1 is a device for enhancing removal of liquid from fabric.

MICHAEL W. STARKWEATHER P.C.
8 EAST BRAOADWAY STE.600
SALT LAKE CITY, UTAH 84111

BRIEF SUMMARY OF THE INVENTION

[0007] The present invention has been developed in response to the present state of the art, and in particular, in response to the problems and needs in the art that have not yet been fully solved by currently available vacuum head devices. Accordingly, the present invention has been developed to provide a device for vacuum systems that overcome many or all of the above-discussed shortcomings in the art.

[0008] A vacuum head device for removal of liquid from an object is provided. In one embodiment the vacuum head device may comprise a first surface coupled to the device, a second surface coupled to the device and configured to penetrate the fabric, and an extraction slot formed by the first and second surface. Preferably, the vacuum head device is configured to remove a liquid from a carpeted surface. However, the vacuum head device functions equally well removing a liquid from a fabric.

[0009] The first and second surfaces may have a V-shaped cross-section. In further embodiments, the surfaces may have, but are not limited to a substantially circular cross-section, or a substantially rectangular cross-section, with rounded edges. Additionally, the first surface may comprise a plurality of channels extending toward the extraction slot, the plurality of channels configured to force liquid towards the extraction slot.

[0010] In one embodiment, the plurality of channels is disposed at a bottom surface of the V-shaped cross section. Furthermore, the first surface may comprise a plurality of contact points disposed between the channels configured to apply pressure to the object.

[0011] Reference throughout this specification to features, advantages, or similar language does not imply that all of the features and advantages that may be realized with the present invention should be or are in any single embodiment of the invention. Rather, language referring to the features and advantages is understood to mean that a specific feature, advantage, or characteristic described in connection with an embodiment is included in at least one embodiment of the present invention. Thus, discussion of the features and

MICHAEL W. STARKWEATHER P.C.
8 EAST BROADWAY STE.600
SALT LAKE CITY, UTAH 84111

advantages, and similar language, throughout this specification may, but do not necessarily, refer to the same embodiment.

[0012] Furthermore, the described features, advantages, and characteristics of the invention may be combined in any suitable manner in one or more embodiments. One skilled in the relevant art will recognize that the invention can be practiced without one or more of the specific features or advantages of a particular embodiment. In other instances, additional features and advantages may be recognized in certain embodiments that may not be present in all embodiments of the invention.

[0013] These features and advantages of the present invention will become more fully apparent from the following description and appended claims, or may be learned by the practice of the invention as set forth hereinafter.

MICHAEL W. STARKWEATHER P.C.
8 EAST BRAOADWAY STE.600
SALT LAKE CITY, UTAH 84111

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] In order that the advantages of the invention will be readily understood, a more particular description of the invention briefly described above will be rendered by reference to specific embodiments that are illustrated in the appended drawings. Understanding that these drawings depict only typical embodiments of the invention and are not therefore to be considered to be limiting of its scope, the invention will be described and explained with additional specificity and detail through the use of the accompanying drawings, in which:

[0015] Figure 1 is a schematic block diagram illustrating a cross-section of one embodiment of a vacuum system in accordance with the present invention;

[0016] Figure 2 is a schematic block diagram illustrating one embodiment of a vacuum head device in accordance with the present invention;

[0017] Figure 3 is a top and side perspective view diagram illustrating one embodiment of a vacuum head device in accordance with the present invention;

[0018] Figure 4 is a schematic block diagram illustrating one embodiment of a vacuum head device in accordance with the present invention;

[0019] Figure 5 is a schematic block diagram illustrating one embodiment of a vacuum head device in accordance with the present invention;

[0020] Figure 6 is a bottom and side perspective view diagram illustrating one embodiment of a vacuum head device in accordance with the present invention;

[0021] Figure 7 is a top and side perspective view diagram illustrating one embodiment of a vacuum head device in accordance with the present invention.

MICHAEL W. STARKWEATHER P.C.
8 EAST BRAOADWAY STE.600
SALT LAKE CITY, UTAH 84111

DETAILED DESCRIPTION OF THE INVENTION

[0022] Reference throughout this specification to "one embodiment," "an embodiment," or similar language means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment of the present invention. Thus, appearances of the phrases "in one embodiment," "in an embodiment," and similar language throughout this specification may, but do not necessarily, all refer to the same embodiment.

[0023] Furthermore, the described features, structures, or characteristics of the invention may be combined in any suitable manner in one or more embodiments. One skilled in the relevant art will recognize, however, that the invention can be practiced without one or more of the specific details, or with other methods, components, materials, and so forth. In other instances, well-known structures, materials, or operations are not shown or described in detail to avoid obscuring aspects of the invention.

[0024] Figure 1 is a schematic block diagram illustrating a cross-section of one embodiment of a vacuum system 100. The vacuum system 100 may be used to withdraw fluid from a carpeted surface 102. Such a system 100 may be constructed initially in a carpet cleaning machine or other machine, or it may be attached to existing machines. The vacuum system 100 may comprise a vacuum head device 104 coupled to the vacuum machine 106. The vacuum system 100 is movable on or through the carpeted surface 102, and the vacuum machine 106 is configured to withdraw a fluid 108 under a vacuum force supplied by the vacuum system 100, as is well known in the art.

[0025] In one embodiment, the vacuum head device 104 comprises a first surface 110 and a second surface 112. As depicted, the cross-sections of the surfaces 110, 112 may be substantially circular. Additionally, the first surface 110, or leading surface, is preferably smaller. The surfaces 110, 112 are attached to the portion of the device 104 that will contact the fabric or carpeted surface 102 so that the when force is applied the surfaces 110, 112 will extend into the fabric. The surfaces 110, 112 may be oriented and shaped in any fashion that

MICHAEL W. STARKWEATHER P.C.
8 EAST BRAOADWAY STE.600
SALT LAKE CITY, UTAH 84111

will push liquid 108 toward the vacuum machine 106 for extraction. The second, larger surface 112 acts as a barrier to the liquid 108 and functions in a manner similar to the way that a snow plow pushes snow ahead and to the side of the plow.

[0026] As will be described with reference to Figures 2 and 3, the surfaces 110, 112 may be bars to which the vacuum machine 106 is attached. Alternatively, the surfaces 110, 112 may have, but are not limited to, a substantially rectangular cross-section, a V-shaped cross-section, or an elliptical cross-section. A gasket (not shown) that is well known in the art may be placed between the vacuum machine 106 and the vacuum head device 104 to form a seal when the device 104 is attached. In a further embodiment, the vacuum head device 104 may be attached to a wand or other nozzle.

[0027] Figures 2 is a schematic block diagram illustrating one embodiment of the vacuum head device 104 of the present invention. As illustrated, the vacuum head device 104 may comprise the first surface 110, and the second surface 112 as described above. Additionally, the vacuum head device may have protrusions 114 for coupling the vacuum head device 104 to a vacuum device (not shown). In one embodiment, only the protrusions 114 are inserted into the vacuum device wand or other attachment. The protrusions 114 prevent the above described gasket from inadvertently obstructing fluid extraction.

[0028] Figure 3 is a top and side perspective view illustrating one embodiment of the vacuum head device 104. The first surface 110 and the second surface 112 form an extraction slot 116. The cross-sectional area of the extraction slot 116 is selected to be large enough to permit solid contaminants that can be expected to be in the liquid to pass through the extraction slot 116 without clogging the extraction slot 116. Since such contaminants are generally larger than the diameter of carpet fibers, the selected cross-sectional area of the extraction slot 116 is larger than the carpet fibers and therefore carpet fibers will not clog the extraction slot 116.

[0029] The vacuum head device 104 is designed to minimize the surface area of contact between the carpeted surface 102 and the vacuum head device 104. Since pressure is

MICHAEL W. STARKWEATHER P.C.
8 EAST BRAOADWAY STE.600
SALT LAKE CITY, UTAH 84111

equal to force divided by the component of surface area that applies such force and that is perpendicular to the body to which force is applied, the pressure exerted by the device upon the fabric is increased by decreasing the surface area of the device that contacts the fabric. Advantageously, the reduced surface area also minimizes wear and tear on carpeted surfaces.

[0030] When force is applied to the device, the surface 112 extends farther into the fabric than any other portion of the device. As described above, this allows the second surface 112 to function in a manner similar to a snow plow or squeegee, collecting liquid in the fabric for removal through the extraction slot 116.

[0031] Figure 4 is a schematic block diagram illustrating one embodiment of the vacuum head device 104 of the present invention. In the depicted embodiment, the first surface 118 may comprise a plurality of channels 120. The configuration of the channels 120 will be discussed in greater detail below with reference to Figures 5-7. The first surface 118 may be selected with a cross-sectional area substantially equivalent to the second surface 112. Without the plurality of channels 120, such a cross-sectional area would inhibit the flow of liquid towards the extraction slot 116.

[0032] Referring now to Figure 5, shown therein is a front perspective view diagram illustrating one embodiment of the vacuum head device 104. In one embodiment, the first surface 118 comprises a plurality of channels 120. As illustrated, five channels 120 direct fluid towards the extraction slot. However, the first surface 118 may be configured with any number of channels 120 deemed to effectively extract liquid from the carpeted surface 102. The channels preferably extend from the forward edge of the first surface 118 to the extraction slot 116. The channels 120 are preferably formed at the lower end of the first surface 118, such that the channels 120 can be located closer to the fluid at the bottom of the carpeted surface 102. Advantageously, the channels 120 allow fluid to flow into the extraction slot 116 formed by the first surface 118 and the second surface 112.

[0033] Figure 6 is a bottom and side perspective view diagram illustrating one embodiment of the vacuum head device 104. As depicted, the plurality of channels 120 is

MICHAEL W. STARKWEATHER P.C.
8 EAST BROADWAY STE.600
SALT LAKE CITY, UTAH 84111

configured to funnel fluid towards the extraction slot 116. The plurality of channels 120 advantageously allows liquid that may build up in front of the first surface 118 to pass to the extraction slot 116. Additionally, the plurality of channels 120 is formed with a generally rounded profile to minimize damage to the carpeted surface 102.

[0034] Alternatively, the plurality of channels may be formed with substantially rectangular contact points 122. The contact points 122 represent the lowest part of the first surface 118, and are the points that apply the most pressure to the carpeted surface 102. The contact points 122 are preferably configured with a small contact surface area. The small contact surface area decreases friction between the vacuum head device 104 and the carpeted surface 102 as the vacuum head device 104 travels over the carpeted surface 102.

[0035] Referring now to Figure 7, shown therein is a top and side perspective view illustrating one embodiment of the vacuum head device 104. As described above, the plurality of channels 120 may be configured with semi-rectangular contact points 122. In a further embodiment, the plurality of channels 120 may be configured with semi-circular contact points 122. A more rounded, gentle profile will decrease drag and damage done to the carpeted surface 102 by the vacuum head device 104.

[0036] The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope.

[0037] What is claimed is:

MICHAEL W. STARKWEATHER P.C.
8 EAST BROADWAY STE.600
SALT LAKE CITY, UTAH 84111